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“Their Markers as they Go”: Modified Trees as Waypoints in the Dena’ina Cultural Landscape, Alaska

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Abstract

The Inland Dena’ina, an Athabaskan people of south-central Alaska, produce and value Culturally Modified Trees (CMTs) in myriad ways. Ethnographic interviews and field visits conducted with Inland Dena’ina residents of the village of Nondalton, Alaska, reveal the centrality of CMTs in the creation and valuation of an Indigenous cultural landscape. CMTs serve as waypoints along trails, as Dena’ina people travel across vast distances to hunt wide-ranging caribou herds and fish salmon ascending rivers from Bristol Bay. CMTs also provide bark and sap used in Dena’ina material culture and medicines, leaving signature marks upon the spruce, birch, and other trees found in the sprawling taiga forest of the region. Dena’ina travelers value these markers as gifts from their elders and ancestors, helping modern-day people to orient themselves geographically, culturally, and spiritually. Today, with industrial-scale resource extraction proposed for Dena’ina traditional lands, including extensive open-pit mines, there is new urgency in demonstrating the geographical presence and extent of potentially affected Dena’ina people. CMTs have been overlooked in existing literatures in spite of their ubiquity and their cultural importance. Our research draws from the first-hand accounts of Dena’ina elders and survey across the landscapes of the Lake Clark core of the Dena’ina homeland.

Keywords Culturally modified trees · Dena’ina · Ethnobotany · Mining · Native cultural landscapes · North-Western North America · Nondalton, Alaska

*A tree is like a person, when it gets old it falls down,
bends over,
just like a person, when they get old,
then they’re gone.*
– Agnes Cusma, Nondalton AK

Introduction

Trees have special meaning for the Athabaskan-speaking inland Dena’ina people who for countless generations have

lived on Lake Clark on the Alaska Peninsula and on nearby rivers such as the Mulchatna and Stony that wind across the tundra to Bristol Bay (Evanoff 2010; Balluta and Kari 2008; Gaul 2007; Evan *et al.* 2006; Ellana and Balluta 1989; Kari and James 1982; Lynch 1982; Smith and Shields 1977; Osgood 1966). For the inland Dena’ina, trees provided food, medicine, fuels, and materials, serving as markers for generations of people travelling across the land. We describe the diverse functions and meanings of trees modified in ways to achieve these cultural ends. Such “culturally modified trees” (CMTs) abound within the Dena’ina homeland yet are commonly overlooked by non-Native observers, although they are enduring markers of human presence and stewardship of the land, helping travelers navigate both the tangible and intangible contours of the Dena’ina world.

The inland Dena’ina homeland sits at a unique geological and biological convergence: a network of rivers and freshwater lakes at the intersection of rolling lichen-clad tundra, jagged ice-capped cordillera peaks, and dense boreal forests of white birch (*Betula papyrifera*, Marshall) and white and black spruce (*Picea glauca* [Moench] Voss; *Picea mariana* [Mill.] Britton, Sterns & Poggenb.). Here, inland Dena’ina cultural and subsistence traditions remain robust in spite of historical

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upheavals and population consolidation in the village of Nondalton on the shores of Lake Clark (*Qizhje Vena*) (Jones 2013; Gaul 2007; Osgood 1966). Today, Dena'ina families sustain themselves by harvesting migratory herds of caribou, moose, and beaver along freshwater margins, vast runs of salmon ascending annually from Bristol Bay, and many other fish, birds, mammals, and plants within their territory. Enduring subsistence traditions not only contribute to the diet of inland Dena'ina families, but sustain keystone cultural activities and values, enhancing people's sense of identity—subsistence harvests being key to what it means to “be Dena'ina” (Jones 2013; Evanoff 2010; Ellana and Balluta 1989).

Within the Dena'ina homeland, patterns of movement and resource use are traditionally expansive and wide-ranging (Fig. 1). Historically and in recent times, families hunting caribou have traveled sometimes hundreds of kilometers to pursue migrating herds. The pursuit of moose, beaver,

freshwater fish, and certain plants involves long-distance travel along riparian areas and lakeshores. Some prime fishing and hunting areas may be “fixed” in the landscape—especially “fish camps” at salmon fishing stations—but others are diffuse and widespread across the traditional homeland. Far-reaching travel over land is key to survival, lending trails (*tinitun*) unique cultural significance. Trails link Dena'ina communities to the key habitats, lifeforms, and landmarks of their homeland, connecting culturally significant lands and resources, and dotted with campsites old and new. Their significance is reinforced through Dena'ina oral traditions speaking of travel, harvest sites, encampments, and the landscapes of home (Gaul 2007; Evan *et al.* 2006; Osgood 1966; cf. McCormack 2017).

While Dena'ina presence is widespread across their traditional homeland, crisscrossed by trails and dotted with camps, harvest sites and storied places, the tangible evidence of their presence is remarkably subtle. To some observers, Dena'ina

Fig. 1 Map of the Inland Dena'ina Homeland, courtesy Eric Owen



use can seem diffuse, and specific traces of Dena'ina occupation of their lands elusive. Their trails may be seen as merely open pathways through the boreal forest or known routes across the tundra with few tracks or traces on the ground. An unoccupied Dena'ina camp can appear to be nothing more than an open clearing, tucked behind sheltering rocks or trees. The presence of trails and evidence of Dena'ina use of the land is hard to detect for specific reasons. What might be called in modern terms, a “no-trace ethic,” rooted in core Dena'ina cultural values, proscribes leaving significant or enduring indications of human presence on any part of the homeland outside of villages or major camps (papers in Evanoff 2010).

Although the elusiveness of clear Dena'ina physical presence on the landscape may seem a largely cultural or academic concern, this phenomenon increasingly impacts Dena'ina life in new and often negative ways. Due to the subtlety of physical cues, public lands managers, operating under U.S. cultural resource law and policy, often have poor documentation of Dena'ina traditional land and resource use sites. Surveys for evidence of human activity on these lands mainly seek archaeological signals, which can be elusive in this context. In turn, traditional use areas tend to be overlooked in federal and state inventories. In planning for future land uses, even well-established resource harvest sites of the Dena'ina are at times excluded from assessments of “cultural resources” within public stewardship.

In recent years, the absence of particular Dena'ina traditional use areas from the discourse on planning, policy, and academia has become problematic. Certain private firms and public agencies propose a number of developments in Dena'ina homeland, including proposals for vast, open-pit mines squarely situated within traditional inland Dena'ina homeland. Among those proposed for the heart of Dena'ina territory is Pebble Mine, a controversial open-pit mine for gold, copper, molybdenum, and other minerals that—if developed—could become the largest such mine on Earth. Surveys of potential mining claim areas have revealed relatively few physical traces of Dena'ina use and occupation, generating questions among regulators and policymakers as to the salience of traditional Dena'ina land uses in the area. Though ethnographic studies have countered these misapprehensions with some success, the absence of clear physical markers of Dena'ina occupation over these lands remains a persistent challenge. Ironically, inland Dena'ina people, who for generations sought to leave little trace of their presence on the land, are now required to identify physical traces of their presence in time-honored places of travel, resource harvests, and enduring cultural meaning within their homeland (U.S. Army Corps of Engineers 2019; S.R. Braund and Associates 2011). The Dena'ina now face persistent questions of what physical traces of their presence are to be found in the landscape and how these physical traces might relate to the overarching themes of Dena'ina culture, values, subsistence, land use, and stewardship.

One tangible indication of Dena'ina use and occupation of their homelands is their long-term use of trees as markers and cultural icons. And, among the main cultural features that Dena'ina elders identify in the landscape, perhaps none is as ubiquitous as CMTs. These trees exhibit physical evidence of human harvesting, modification, or other activities even in the absence of other unambiguous forms of evidence on the landscape. Though subtle, these modifications appear across the Dena'ina world as blazes or partially limbed trees, but also in the form of stumps, topped trees, and living trees scarred by bark removal. These are physical markers, but also landmarks of enduring cultural significance. Inland Dena'ina understand older CMTs to be the handiwork of the ancestors, created long ago for the wellbeing of future generations. Traveling through the landscape, modern Dena'ina appreciate these features as culturally significant landmarks—even as “sacred” in the view of some tribal members, as they are the handiwork of people and lifeways from long ago. They are essential waypoints in the cultural landscape of the inland Dena'ina, helping contemporary tribal members navigate the land geographically, culturally, and spiritually—in the footsteps of the ancestors (McCormack 2017; Blackstock 2001).

Engaging the Importance of Culturally Modified Trees

A growing literature reflects an appreciation of the importance of CMTs to Indigenous peoples worldwide for specific cultural, dietary, spiritual, or navigational purposes (Rautio *et al.* 2013; Turner *et al.* 2009; Östlund *et al.* 2002; B.C. Archaeology Branch 2001). CMTs are important traditional material culture elements and the focus of enduring Native oral traditions. The earliest written documentation of north-western North America also mentions CMTs, including explorer Alexander Mackenzie (1801) who noted scarred hemlocks in British Columbia, and Meriwether Lewis and William Clark who noted “peeled” trees in the Rocky Mountains and scarred trees in the Bitter Root Mountains (DeVoto 1953). In each case, Indigenous people had harvested the edible inner bark and cambium of the trees. Early anthropological accounts (Osgood 1933) also documented Dena'ina harvest of basketry materials and resulting CMTs in the territory that became Alaska.

Early CMT documentation generally accompanied archaeological surveys in the American and Canadian West (e.g., Fladmark 1971; Borden 1951), though descriptions at that time were usually ancillary (Pegg 2000). The first systematic documentation of CMTs occurred in the mid-twentieth century—such as White's (1954) survey of ponderosa pine cambium harvests in eastern Montana. A generation later, coastal north-western North America became the focus of early systematic CMT documentation by researchers such as Hicks (1985), Mackie (1983), and Bernick (1984). Additional attention focused on classification (Eldridge 1997),

dendrochronology, distribution (Mobley and Eldridge 1992), and criteria to distinguish cultural from natural scars (Eldridge *et al.* 1984).

Nonetheless, much literature regarding CMTs remains “largely descriptive, unpublished, [and] difficult to access,” appearing in gray literatures and survey reports rather than in academic publications (Pegg 2000:77). CMT inventories exist primarily as an element of compliance surveys required for the management and extractive industrial use of forests. In part due to prompting by Canadian First Nations, CMT research and documentation has advanced significantly in the Canadian West (Budhwa 2005; Pegg 2000; Eldridge 1997; Nicoll 1981). British Columbia’s Heritage Conservation Act now requires consultation with First Nations before removal of CMTs (Earnshaw 2016; Klimko *et al.* 1998; Eldridge 1997). Federal agencies undertake most United States CMT inventories, especially the U.S. Forest Service (Eldridge 1997; Davis 1992). Some U.S. jurisdictions have moved beyond mere surveys, documenting CMTs as part of their larger legal mandates to protect cultural sites. Gifford Pinchot National Forest in Washington State, for example, created a Programmatic Memorandum of Understanding between the US Forest Service and the Federal Advisory Council on Historic Preservation in 1985 resulting in inventories of CMTs and regulations for their preservation (Mack and Hollenbeck 1985). As a result, “bark stripped cedar trees were deemed eligible to the National Register of Historic Places” (Mobley and Eldridge 1992:93). In Alaska, the Tongass National Forest operates under a CMT management plan, requiring inventory and, when possible, protection of CMTs throughout that forest (Mobley and Eldridge 1992; Mobley *et al.* 1990; Mobley 1989; Ream and Saleeby 1987). Despite widening attention, CMTs remain at risk in many areas from industrial forestry, urban expansion, and agricultural clearing (Earnshaw 2019; Turner *et al.* 2009; Budhwa 2005; Stryd and Feddema 1998).

Moreover, CMT documentation within archaeological survey and protection is still underdeveloped compared to many other types of archaeological features. In spite of advances, CMTs are too often treated as material resources to be surveyed and managed rather than as manifestations of living cultural practices (Budhwa 2005; Turner *et al.* 2000; Stryd and Feddema 1998; Eldridge 1997). Recent academic researchers have expanded their focus, assessing CMTs as contributing elements to larger culturally significant landscapes (Earnshaw 2017; Lepofsky *et al.* 2017; Turner *et al.* 2009; Stryd and Feddema 1998; Jett 1994; Stryd and Eldridge 1993; Mobley and Eldridge 1992). Kawa *et al.* (2015:184) refer to CMTs as *vivifacts*, or “living artifacts.” Some authors have explored how Indigenous harvesters’ decisions to keep trees alive when removing products like bark or sap, reflects deeply-rooted cultural values about respect toward trees that are also pertinent to the contemporary management of those

trees on public lands and beyond (Deur 2009; Turner *et al.* 2009; Budhwa 2005; Pegg 2000; Turner *et al.* 1998). We offer this article in the spirit of this reevaluation, recognizing that CMTs remain an essential component of both enduring Indigenous cultural practices and enduring Indigenous cultural landscapes across the world, and can only be meaningfully understood within those contexts.

In spite of this literature and the clear significance of CMTs to inland Dena’ina people, the somewhat distinctive roles of CMTs in Dena’ina tradition have scarcely been addressed in literature. We provide here a corrective so these elements of the Dena’ina cultural landscape are no longer overlooked nor forgotten. We illuminate these landscape features as part of a wider critique. As a growing literature attests (e.g., Lepofsky *et al.* 2017; Turner *et al.* 2013; Deur and Turner 2005), north-western North America abounds in underreported anthropogenic landscapes—culturally modified and meaningful yet, by virtue of their underrepresentation in written literatures, lost to Indigenous peoples. Historically, such anthropogenic landscapes have been excluded from land claims, required pre-development surveys, and other considerations that might protect Native access and site integrity thereby contributing to the erasure of such landscapes from the physical landscape and, over time, from the recalled histories of many Native communities (Deur *et al.* 2013). By recognizing the character and origin of Dena’ina CMTs, we hope not only to celebrate underreported Dena’ina cultural practices, but to inform modern resource management in traditional Dena’ina lands. We identify common CMTs overlooked by past writers but clearly identified by Dena’ina elders in the course of systematic interviews and field visits. In doing so, we wish to correct such oversights on Dena’ina lands so the landscapes and cultural practices that contributed to their formation might endure.

Methods

Over the past decade, documentation needs associated with public land management and development proposals prompted U.S. federal agencies, mining companies and their consultants, and Native villages and corporations to intensely document cultural uses and landmarks within inland Dena’ina traditional territory. Given the lack of available information, lead authors Deur and Evanoff carried out several studies to document enduring Dena’ina relationships to the landscapes and resources of their traditional homelands. A Dena’ina researcher from Nondalton, Evanoff benefitted from elders’ instruction on such topics throughout her early life. Becoming a National Park Service Anthropologist for Lake Clark National Park and Preserve (LACL) enabled her to expand this work through direct ethnographic studies on topics ranging from Dena’ina place names to traditional fishing methods, key

Dena'ina resource ethics, and methods of catching and processing beaver (Evanoff 2010). Since 2011, Dr. Douglas Deur has collaborated with Evanoff in a series of studies related specifically to traditional Dena'ina land and resource use within LACL and on tribal lands adjacent (Deur *et al.* 2018; Nondalton Tribal Council 2014).

In the course of this work, and especially as part of a traditional use study of the Chulitna River Basin (Deur *et al.* 2018), Deur and Evanoff systematically conducted interviews with Dena'ina individuals from the Nondalton community related to enduring uses of the land—each involving a subset of open-ended questions that asked interviewees to identify known “Dena'ina imprints” on the physical landscape. The findings of this article result from interviews involving 37 Dena'ina individuals; specific quotations and paraphrased content reflects specific comments made by 15 Dena'ina individuals from Nondalton and vicinity – eight men, seven women, ranging from active subsistence harvesters in their 30s to elders in their 90s. Recurring themes were identified and analyzed from interview recordings, transcripts and fieldnotes—including but not limited to the CMT data presented here. Quoted individuals are named in the References. In addition, Deur and Evanoff accompanied knowledgeable Nondalton subsistence harvesters to traditional use areas, such as the shorelines of Lake Clark, Chulitna River, and along the Dena'ina pathway called the Telaquana Trail. In these settings, Dena'ina knowledge-holders such as George Alexie and Butch and Pauline Hobson participated in additional interviews in situ—identifying places of importance to Dena'ina people and the physical traces of Dena'ina use still evident in the landscape. Deur and Evanoff documented these landmarks, photographed them, and typically GPS-recorded them for later analysis and mapping. Clearly, even in areas not settled permanently or year-round, data suggest how Dena'ina traditional practices and values left discernible physical traces on the landscape. This article, along with a comprehensive review of available published and unpublished literatures, is one outcome of this field research.

Results

The Form and Meanings of Culturally Modified Trees in the Dena'ina Cultural Landscape

Elders assert that trees, in general terms, hold a unique place in traditional Dena'ina culture that is often overlooked in written accounts. Within Dena'ina tradition, trees are understood not only as living, but as nominally conscious, sentient beings. Oral tradition describes the life cycles of trees running parallel human life cycles: they start off young and limber but stiffen as they age. So too, without proper nurturing and

nourishment, trees risk becoming bent, rickety, and inflexible—points invoked in traditional Dena'ina prescriptive teachings. As a matter of Dena'ina cultural practice: “*you show them respect.*” As elder Pauline Hobson (2010: 29) summarizes when teaching Dena'ina values to tribal youth, they must “*Respect the plants also, especially the trees—they have spirit too. If you disrespect it, it will change your luck in life.*”

Dena'ina people show this respect in myriad ways. While some modification of the landscape is necessary, Dena'ina traditionally proscribe unnecessary modifications that create lasting harm or “disrespect” the trees. They make marks on trees and on the wider landscape, but only modest ones. One Nondalton subsistence hunter explains efforts to minimize harm to trees in the context of wider values: “*You want to leave the land the way it was when you got there [T] hat was a rule that was explained to us.*” For this reason, many types of traditional resource use, including tree use, remain largely invisible to the casual observer. Another interviewee suggests, “*You can't tell if I was picking berries. You can't tell if I was fishing.*”

Traditionally Dena'ina harvesters do not cut or kill trees casually, but only when a pressing need exists—an ethic common among Indigenous peoples. They harvest only a part of the tree, but do not kill the whole tree unnecessarily. Traditionally, even when a tree is killed, certain respects are shown in how the tree is approached and how the wood is handled: “*even when you cut wood, you don't just throw them anywhere. You pile that up nearby. ... That stacked wood can be a home for the animals.*” Such ethics have been noted previously, as in Kari's assertion that Dena'ina harvesters of spruce roots used in basketry intentionally take a small number of roots from any one tree (1995: 33). While inland Dena'ina people freely use wood and modify trees in various ways, this notion of respect organizes their relationship with trees and limits the uses of trees on their land.

Among the most enduring, important traces of Dena'ina traditional land use are the many CMTs that remain alive even as Dena'ina travelers modify the trees or remove parts of them for personal use. Again, mentions of CMTs are remarkably rare or absent in spite of occasional references to Dena'ina plant use in available literatures (Kari 1995; Osgood 1933). Yet, our data suggest these features abound in certain heavily used parts of the Dena'ina homeland, such as the greater Chulitna River Basin, attesting to both the extensive historical use of those lands, and keystone cultural values and practices manifested there over deep time.

Tree Blazes and Wayfinding in the Dena'ina World

Along the vast trail network traversing inland Dena'ina country, one finds blazes (*kle'aknithle*) on tree trunks to mark trail

routes, concentrated at trailheads, trail fords and portages over waterways, and at seasonal campsites along the trails (Fig. 2). A Nondalton elder describes how Dena'ina travelers made these blazes long ago:

Over the summertime, they used to make the new trails where they're traveling with only their dogs and their backpacks; that's going camping. But they have to make a mark on the trees, you know, with an axe, just peel it on each side as they're going; that's making a trail.

Another explains that these practices persist today: “Pretty much all the trails are mostly winter trails and they're all blazed out ... we tend to mark trails pretty well.” The

realignment of certain winter trails from the relatively circuitous routes of dogteams to the linear pathways of snowmachines created the need for a new generation of blazes to orient travelers along realigned trails through the late-twentieth century.

Thus, tree blazes are widespread subtle elements of the cultural landscape. Positioned for maximum visibility, generally at chest height, they consist of vertical areas of removed bark, roughly 0.5 m to nearly 1 m in length. Blaze-makers often prune the lower tree limbs to make the mark more visible: “they'll limb it way up quite a bit; they sometimes do this ‘on both sides’ so that it can be seen from both directions.” On winter trails, blazes tend to be higher than those on summer trails, to accommodate the depth of snow. They are found on

Fig. 2 Navigational blaze on Spruce amidst older blazes overgrown with tree bark, at Chulitna River trail crossing



conifers and hardwood trees—especially spruces and birches. Non-Native trappers and hunters have also created blazes on trees in the area, and Dena'ina consultants indicate that based on stylistic differences they can distinguish blazes made by local, Native travelers. Bark peels easily in the warm months, but takes more force to remove in the winter when the sap is not running. Knowing this, and assessing the condition of a blaze, one can infer the time of year when a blaze was cut. Older blazes have the look of laborious chopping with steel tools—with especially old and important blazes sometimes cut deep into the underlying wood.

Blazes reduce people's disorientation on the landscape. They are highly important for safety, ensuring that travelers do not miss a key turn or campsite when traveling in inclement weather, at dusk, or at other times when navigation is difficult. And, as some interviewees note, disorientation in travel can be deadly, especially in very cold weather, in whiteout conditions, or when a member of the party is cold or injured. In this context, crossings at waterways are considered especially challenging because the shoreline vegetation can be dense, ice conditions can require detours, and trail crossings of rivers can become key intersections. It is easy to miss an important turn along the way. Accordingly, there are "... several places [where] there's a portage that goes over the river. Instead of following the crooked river, blaze it out real good, so you can pick up the trail on the other side." Similarly, blazes sometimes mark points where a traveler must re-enter the boreal forest after long treks over the tundra, allowing potentially disoriented travelers to walk the timberline until they find blazes revealing a known, safe path through the forest.

In addition to marking the routes of trails, blazes mark landmarks important for travelers, such as turnoff points for cabins or camps not detectable from a main trail. As many elders recall, "They had their own special mark where they hunt and camp. They would ... mark trees with axe so they know where the trail is. They chop through the area to make the trail" (Carltikoff *et al.* 2010:15). Trappers also use blazes to locate traps along traplines across expansive taiga and tundra-margins within their traditional homeland. Nondalton trappers, for example, maintain blazes on trees along their traplines, adding new blazes as needed: "Just where I got my traps sometimes, I'll mark or blaze a tree. Then I know I got a trap set there. Pretty much all the trails I know. Once I run all over on a snowmachine, I know it's there. [On less known or visible trails] we should start blazing it so we know there's a trail there."

Blazes from the distant past hold special significance. Often the handiwork of the ancestors, they transmitted knowledge of the landscape and potential hazards for descendants' wellbeing. Like Dena'ina trails or place names, blazes convey ancestral knowledge of a place's attributes across time. These blazes represent the few traces of the ancestors still visible on the land. Conveying messages for the protection of the living,

the oldest blazes have been described as "culturally important," and even "sacred" by modern Dena'ina people.

Recognized for their great importance as navigational landmarks, tree blazes are considered superior to stakes or other markers, which can be disturbed or buried by snow: "*It wouldn't do any good to put stakes up. The bears will knock it up and tear it up and move it.*" However, other types of markers are sometimes used. For example, in open snowy country, as in mountain passes, poles are at times embedded in the ground to guide travelers. In a few instances where blazes are not practical or a person is traveling through an area only briefly, Dena'ina travelers have marked places by wedging a ball of moss or lichen in the forked branches of trees. Though not as durable as a blaze, moss markers are said to be visible many years after their creation (cf. Carltikoff *et al.* 2010; Osgood 1933). "*If they're only going for a week ... they'll put moss on the brushes ...: that's their markers as they're going.*" In sparse lands where trees are absent, Dena'ina elders traditionally inserted sticks tall enough to be seen over the winter snow into the tundra to mark safe trails, a practice called "*chik'a hnideyelt*" (embedded sticks).

(Balluta and Kari 2008:83–85).

Dena'ina travelers are still creating new blazes. People also look after the blazes, improving the cuts as needed so they can be seen, and so that tribal members less familiar with a trail can find their way by following waypoints of more experienced travelers: "*Every year, they're improved a little better. I know Darren [C.]—I've followed his trails quite a few times and his trails are blazed pretty well.*" People will remove pitch or hanging branches that have obscured a blaze, or sometimes remove additional bark to keep the blaze open and visible.

Some trails, when not maintained, become overgrown and detectable only on the basis of old blazes. They get "*grown over really good.*" One elder offers the example of an old shortcut trail connecting Chulitna River and Sixmile Lake—two cornerstones of the Dena'ina homeland—as one of several trails that must now be inferred on the basis of old blazes: "*hardly anybody goes that route anymore...if you took this [old] route, it's probably growing in because nobody goes that trail.*" If a trail is not maintained and modern travelers attempt to use it, they can get disoriented or bogged down in the very slow and arduous work of clearing the trail. As a Nondalton subsistence hunter says of one such trail he encountered, "*I probably broke a trail that wasn't the main trail in a couple places because it was so thick.*" In reopening older trails, blazes provide critical assistance.

The Cultural Functions of Partially Limbed Trees

Beyond blazed trees, other culturally modified trees are seen on the landscape, linked to traditional trails, camping, and other subsistence activities. Another category of CMT, partially limbed trees, are widely seen within the inland Dena'ina

homeland. At campsites, the lower limbs of white and black spruce trees are removed “to clear the area a little bit” and allow for a larger camp. Axe-cut branches, their stubs, visible up to roughly 2 m from the ground, are common at well-established campsites. Limbs are not always removed from the full circumference of the tree, only on the sides where clearing is helpful to campers. Usually the lower branches are cut, not only due to their accessibility, but to leave the standing tree with upper branches intact and available for other uses. In many cases, the remaining branches on standing trees serve as de facto shelters, overhanging campsites and improving cover from the elements. Especially in deep snow or inclement weather, the spaces created beneath the trees can become impromptu or emergency shelters, sometimes half-seriously called a “homemade” or “siwash” tent. Such trees also provide extra rain protection and insulation for fabric tents or other temporary shelters built beneath them. Gear, poles, and firewood can be stored next to the partially limbed tree, out of the rain and snow. Temporary campsites, built in response to urgent or short-term need, also make widespread use of them. Under extreme circumstances, these camps are little more than hastily constructed shelters. If severe weather arrives while Dena’ina people are traveling, or if somebody falls into water in subfreezing temperatures, travelers might enter the edge of woodlands, find a tall alder (especially *Alnus viridis* (Chaix) DC.) or willow (*Salix* spp. L.), clear out all the branches at its center near the trunk, and camp inside, leaving long outer branches draping to or near the ground. Hasty fire-making is also common at these camps, involving gathering dead lower tree branches, or even live branches if necessary. The presence of culturally modified trees at campsites, especially larger and more enduring ones also aids future travelers. Finally, sets of wooden poles for tent construction, as well as dry firewood or branches for fires, are often left for the next visit or visitor, stockpiled under the branches of these CMTs. Poles are typically stockpiled upright against the sheltering tree to prevent rot. Leaving such materials at a camp is deemed important for safety, as well as a kind consideration for the next user, whoever it may be. “They always thought ahead for other people.” Younger hunters say they can easily find and use old camps as necessary based on blazes as well as stockpiled poles, cleared trees, and other evidence: “I can always find campgrounds, like old poles, cans and something like that.”

Travelers sometimes remove the lower branches of trees to create space and cover for curing firewood—a slightly different type of CMT from others involving branch removal. Similarly, Dena’ina travelers often cut logs from living, standing dead, or fallen trees and stockpile the logs in such places to dry—especially important when traveling in winter or during emergencies when dry wood can mean survival. This is traditionally done at camps, but also at wood-harvesting areas nearby (Fig. 3). Travelers often stockpile driftwood from

riverbanks and lakeshores at camps; air-dried, and relatively easy to gather, elders sometimes call driftwood “the best firewood for travelers.” Additionally, branches, birch bark (*Betula papyrifera*) tinder, and other fire-starting materials can be stockpiled with wood under CMTs.

Fire-starting material is gathered and kept at campsites, including pitchy wood or burls, peeled and dried birch bark, and small dried branches of conifer trees. Such fire-starter is critical, and when crossing rivers and streams, Dena’ina people sometimes kept tinder and other fire-starting materials on top of their heads to reduce the odds of damaging it. Pitchy wood, such as from tree burls, is sometimes stockpiled with woodpiles, allowing for quick fire-starting in cold or emergency conditions. Burls and other gnarled trees hold a special place in Dena’ina oral tradition. Elders say that a tree with many burls “doesn’t have a clear mind...it is confused and grows in many different directions, this I heard from the elders.”

Inland Dena’ina men also remove the dead or dying lower branches of spruce trees as quick fire-starting material. In some instances, they begin gathering these branches for fires almost the moment they pull ashore, reflecting generations of experience making camp when cold, damp, and in need of a quick fire. Over time, these practices further open campsites, keeping them free of branches and reducing the risk of accidental wildfires on the margins. The branches removed from such trees have a number of functions. For example, while still green they can serve as temporary bedding. Beds of spruce boughs, covered in caribou hide, have been a common feature of camp life: “you change them every so often when the needles begin falling off. ...Boy, I liked that smell!” When the branches begin to dry, they are stockpiled on site as fire-starter, and new limbs are gathered for bedding.

Not only boughs, but entire tops of tree saplings are sometimes cut. As people clear the surface of the snow at winter campsites, they may cut the tops at the snow line, stockpiling the sapling tops to be used as fire-starter in summer if wood sources are scarce. These modified saplings are visible in the summer as small, topped trees (Fig. 4).

Tree Removal and Stumps in a Cultural Context

Surrounding many Inland Dena’ina camps are stumps, large and small, some related to firewood procurement to support the camp. Dena’ina people also cut poles for tents and other camp uses from trees around the edges of a site, leaving areas of rather uniformly sized, small-diameter stumps. These are disproportionately spruce, reflecting a long-time preference for both black spruce and white spruce in constructing caches, steam baths, fish racks, fish rafts, fish wheels, and many other tools and implements (Ellana and Balluta 1989[11]). Dena’ina elders reported: “Spruce is the single most important plant to the Dena’ina because of the many uses they have for it. The

Fig. 3 Dena'ina hunter's campsite with stockpiled poles, lower spruce limbs removed and stockpiled at the tree's base



fact that the Dena'ina name for spruce, *ch'vala*, or a variation of it, is also the name for 'tree' signifies the value of the spruce to the Dena'ina" (Kari 1995:28). In a few cases, small standing trees—cut or uncut—are incorporated into the underlying structure of camp tents, drying racks, and other camp infrastructure. These trees often have bends, scuffs, or other marks that demonstrate past use in and around camps. For some traveling remotely, these stumps and bent trees hint at the presence of good camping sites, implying the proximity of fresh water, good game, and other desirable attributes, even if the site is otherwise unknown: "*see old cuttings sometimes...like where they cut logs down or something—out in the woods.*"

Harvesters have commonly cut firewood in the areas surrounding major camps—especially as cutting tools became more available over generations. Until a generation ago, spruce and birch were the primary sources of heat for warmth and cooking; these woods remain a paramount in some modern households, while in others they are fallback fuels during power outages or when oil supplies run low. While wood harvesting accelerates at certain times of the year, such as in preparation for salmon harvests or in the winter when people cross the ice to harvest away from the village, it occurs at some level year-round – often moving to successively distant locations over time, as harvesters exhaust desirable local wood (Behnke 1982:40). Nondalton Fish Camp, a short distance south of Nondalton village is representative of patterns seen around camps in Dena'ina country. Firewood harvest in the woodlands west of Fish Camp centers on spruce, birch, alder, and other common species, and stumps from trees cut for smoking fish can be found in the woodlands surrounding the camp. The main cutting areas are accessed by a route called

the "Timber Trail," and similar trails can be found behind camps once used for intensive food processing. Timber Trail extends from a larger trail network between Fish Camp and Nondalton, entering the densely forested woodcutting area with large trees and grassy understory, where some stumps are of considerable antiquity, decomposed and draped in lichen, suggesting generations of tree-cutting in the same general area. Peeled birch bark scars are also numerous in this grove. Though utilitarian in origin, even these stumps are described as culturally significant by some Dena'ina, being landmarks created by ancestors as well as more recently. Oral tradition suggests this area was regularly visited by families with dog sleds who stockpiled wood and other materials for camp and home use.

Along the "water trails" on the shoreline of navigable riverbanks and lakeshores Dena'ina travelers sometimes cut trees overhanging the banks, leaving moderate-length stumps "*to get rid of sweepers*" that put boaters at risk of injury and that prevent easy access to and from the bank. In some cases, remnant stumps are left behind so that people can use them as hand-holds or to tie off boats along the shore. This type of culturally modified tree is found most abundantly beside villages, camps, and major fishing areas such as Nondalton Fish Camp (Fig. 5).

Traditional trail maintenance also involves the removal of "sweepers" that struck dogsleds, their occupants, and/or dogs, resulting in many distinctively marked trees. With the advent of ATVs and snowmachines, people move at greater speeds and at slightly different elevations relative to trees, making the removal more imperative. Cutting has become much more efficient with the availability of lightweight powered saws. For this reason, some interviewees attest that the removal of

Fig. 4 Dena'ina hunter's campsite with young trees cut to snowline



“sweepers” along trail networks has changed in recent decades, becoming more common and involving branches of different elevations than those targeted by earlier trail managers. These CMTs can be identified by cut branches and “stubs” protruding from the sides of standing trees.

Lookouts and Topped Trees

Topped spruce and birch trees are also widely seen in inland Dena'ina country. These CMTs are most common at lookout points, such as on bluffs like Lookout Bluff along Chulitna River, where conifer tops are removed to provide open, clear views of hunting areas. Men sometimes took time during hunts to clear these viewpoints—pruning from below or even

climbing into trees to remove top sections (Fig. 6). Consistent with Dena'ina conventions, much effort may be expended to keep the tree alive unless there is a pressing need to remove the whole tree. When managed this way the trees, “...*don't die: they just grow back.*” Very often, trees that have been topped are difficult to detect years later, as upper branches grow upward to replace the original leader. In older topped trees, new tops, recruited from lateral branches, can reach 2 m or more in height.

Removal of Bark for Food, Material, or Medicinal Use

Many other types of CMTs trees are found, some less directly tied to navigation, travel, and hunting, but linked instead to the

Fig. 5 Small stump, a former “sweeper” near a canoe portage on Sixmile Lake



use of bark for basketry and other traditional crafts along the network of settlements and trails throughout inland Dena'ina traditional territory. At one time, birch bark was used to make sun visors, moose call “whistles,” baby carriers, plates for food, food storage barrels, and even box-like containers for boiling food with hot stones—almost any product requiring a container or wrap of moderate strength (Kari 1995: 42–48; Ellana and Balluta 1989[1]1). As one elder reported, people use, “*birch bark for dishpan, for basin, for steam baths, that birch bark basin. ...Everything birch bark.... Our plate: birch bark. That's all we used.*”

Hannah Breece, who visited Nondalton Fish Camp in 1911, described a birch bark gathering trip with women from Nondalton:

One day the women invited me to go with them to get birch bark for baskets, a round-trip of ten miles. The grove was perhaps the loveliest place I have ever seen, before or since. The white trees stood wide apart, straight and far-reaching, each in its own space, not spindling but a foot or more in diameter.... The women, laughing and happy, wore beaded leather shields at their waists. Drawing sharp knives, they skillfully stripped off as much birch bark as they could carry. ...The next week, among them, they made me seven baskets from my share: handsome, waterproof and durable (in Jacobs 1995:150–51).

Today many birch bark items—from visors to food plates—are still made, intermittently. However, most birch peeling is related to the continued practice of basket-making: “*For baskets, that's why. We see that everywhere. There's*

peels of them [from the birch tree]” (Fig. 7). Often, large pieces are required for these baskets, so that travelers will note large birch trees as they move through the landscape, returning to them for future bark harvests. Smaller trees are sometimes peeled too for bark as a fire starter and other uses. In the past, large quantities of bark were gathered for this purpose: “*they used to pick birch bark, put it away in gunny sacks and use it as fire starter.*” The bark was also peeled to obtain the edible sap: “*...and you can eat that birch sap too: it's sweet...we used the little trees for that...peel off the outer bark to get it.*”

Elders explain that bark is peeled respectfully, in a manner “*so you don't kill the tree,*” by only taking what is needed, avoiding the inner bark and leaving a small strip of outer bark attached to the tree. “*They don't die if you just take the top bark off.*” Done very carefully, one can harvest enough bark to produce small conical shelters over a frame of bent or cut alders or other trees—a historical practice seen occasionally today, with frames still visible at certain camps (Fig. 8). This phenomenon was described by earlier writers such as Osgood (1933: 700), who documented the use of a conical shelter built with a frame of alders “*...used by all the Tanaina [with] a birch bark covering or, on occasions, moss.*” The showing of respect to the tree is traditionally understood to be important, especially if the basket, moose call, or other item made from its bark is to contribute to the life and work of the maker favorably. The energy of the tree, affected by its encounter with the harvester and craftsperson, is said to live on in the object created from the bark. If the tree dies, the harvester often returns to salvage the wood, thus demonstrating respect and the absence of wastefulness (cf. Turner 2008).

Similarly, slabs of spruce tree bark are sometimes peeled from living trees as a surface for cutting fish or for temporary

Fig. 6 Recently topped trees at Lookout Bluff, a popular game lookout for Dena'ina hunters



roofing or flooring in camps. Entire temporary shelters have sometimes been made of poles and peeled tree bark. While the pieces of bark needed for this purpose are large and usually removed from dead or dying trees, a few CMTs with large sections of removed bark originate from this practice. Standing dead trees are also sometimes pulled apart to acquire the reddish-orange inner pulp used in tanning and dyeing moose hides. While the traces of this practice do not last long on the sides of rotting trees, some interviewees reported having encountered logs pulled apart for such purposes when traveling near camps and villages.

In the process of woodcutting, some families might also gather fungal growths from the sides of birch trees, including chaga (*Inonotus obliquus*). Burned in such settings as

Nondalton Fish Camp, their smoke repels mosquitoes. Certain types of fungus are also used as medicine (cf. Gottesfeld 1992). While physical traces of this practice are fleeting, cut fungal growths have been reported in some woodcutting areas, especially close to enduring camps and villages.

Pitch Harvesting

Dena'ina families also traditionally gather spruce pitch (*kengha*) for internal and topical medicines, as well as for waterproofing and other purposes. In modern Dena'ina medical practice, this sap is especially popular for sealing wounds, as a drawing salve, and as a tooth-cleansing gum. One elder describes the enduring use of spruce pitch for wounds: “*That*

Fig. 7 Scar from birch bark, peeled for use in baskets, on Chulitna Bay, Lake Clark



clear pitch you see on that black spruce. ...On that black spruce too that little tiny green too, you make a band-aid out of it.” Another Nondalton resident notes “*They use pitch too, for cuts—gather pitch—it stops the bleeding*” (in Fall *et al.* 2006:175–76). Pauline Hobson also mentions the use of the pitchy inner bark of the spruce for this purpose: “*You can also use the inner spruce bark, the white part. Put it on the cut with the pitch and the bleeding will stop and it never usually leaves a scar!*” (Hobson 2010:30). Spruce pitch has other uses as well: it is still used at times as a sealant for canoes and in traditional craft projects, though the practice is relatively uncommon for everyday use due to the availability of cheap and effective commercial alternatives (cf. Kari 1995; Osgood 1966: 117). In many places, especially close to twentieth

century camps and villages, one still can see pitch-gathering scars—lateral cuts in the spruce bark where sap has been allowed to flow from the tree. These scars heal with time, so that many appear as horizontal anomalies in the bark’s texture, close to chest height. In some cases, these cuts are relatively deep, incising marks into the underlying wood of the tree, perhaps evidence of “pitch wells” designed to capture dripping pitch for later use—a widespread practice in north-western North America. Like all of the CMTs discussed here, these features are diagnostic of ancestral use of the landscape. Linked to healing, medicinal, and spiritual practices that sustained the ancestors, these vivifacts hold cultural significance for modern tribal members, even if the individual who made the initial cut is unknown.

Fig. 8 Conical camp frame made of both bent living trees and cut withes, Chulitna River



Conclusions

A rich Dena'ina cultural tradition relating to trees, including the cultural modification of trees, has been largely invisible in available literature. Yet Dena'ina CMTs are clearly evident in the landscape in the form of blazes, partially limbed trees, stumps, topped trees, and trees with peeled bark. Each type of CMT has its own functional origin and cultural significance. Traveling the boreal forests and tundra margins knowledgeable elders can readily identify and survey these landmarks. As visible and enduring features of the cultural landscape, CMTs remain unambiguous manifestations of cornerstone Dena'ina cultural values and practice, just as they are clear markers of Dena'ina presence on the land.

In interviews with inland Dena'ina elders and within the landscapes of their homeland the presence and significance of CMTs is abundantly clear. Blazes on living trees aid long-distance travelers in navigation through complex or unfamiliar terrain, marking routes and reducing risk of disorientation over time and across generations. Temporary campsites, when unoccupied, are recognizable by virtue of the removed lower limbs of trees, topped saplings, and stockpiled logs and branches for use in camp structures and fires. Stumps of pruned or removed “sweepers” that impede the passage of boats, canoes, dog teams or snowmachines are common along land and water routes. Spruce sap gathering “wells” and peeled birch trees are unmistakable markers of subtle extractive human uses of trees, found especially near camps, villages, and major trails. Topped trees, especially spruce, encircle rock outcrops and other landmarks used by subsistence hunters as game lookouts. These subtly modified trees are generally unmistakable. They serve as enduring markers and

as evidence of widespread and long-term human occupancy of the land in a place where other human modifications of the land are relatively invisible. Especially as contemporary land use proposals call upon Native and non-Native residents of Alaska to consider the human presence and imprint on the land, CMTs merit formal consideration and remain an under-documented but necessary focus of future cultural resource documentation and planning.

We suggest that inland Dena'ina CMTs have been overlooked for multiple reasons—including certain functional dissimilarities to other CMTs documented in north-western North America, associated with the harvest of bark, sap, or cambium. Instead, a majority of the Dena'ina CMTs documented in our studies were created to aid in wayfinding, or as an organizational element within ephemeral camps. True to inland Dena'ina tradition, these landmarks provide orientation within a notably large and geographically dynamic resource hinterland.

As we document and report the diagnostic attributes of these landmarks, we anticipate that future surveys of public lands associated with proposed developments in the Dena'ina homeland, will necessarily include documentation of limbed trees, topped trees, blazes, and other CMT features. Through careful field survey, these landmarks are eminently detectable. Being at once archaeological and traditional use sites (Klimko *et al.* 1998), they may defy easy categorization; yet they clearly denote places of enduring cultural importance and are themselves enduring “cultural resources.” Alongside other archaeological records and the accounts of elders, they serve to verify the location of trails, subsistence harvest sites, and a host of other traditional activities within this homeland (Benner *et al.* 2019; Budhwa 2005; Pegg 2000; Stryd and Feddema 1998).

Development concerns aside, recording CMTs within the inland Dena'ina homeland is an urgent task. Trees are living organisms, constantly undergoing processes of growth and change. As Eldridge (1997: iv) warns, "As a living organism with a finite life span, CMTs can only preserve evidence of indigenous forest use for a few centuries."

Dena'ina people are bound to the trees of their homeland in ancient and reciprocal relationships. As people have long affected the trees in certain ways, guided by the teachings of their culture, so these modified trees have long served as landmarks to travelers, continuing as a key part of living culture today. These modified trees may not only help us navigate trails within the inland Dena'ina homeland, but can illuminate the Dena'ina ethical and cultural terrain as well. When tribal members see these tree modifications, they instantly perceive them as physical reminders of enduring Dena'ina cultural values and practices, touched by the ancestors and confirming oral traditions about gentle care for the land. In this respect, Dena'ina CMTs are not only "cultural resources," comparable to other archaeological sites in a regulatory context—some being potentially eligible for the National Register of Historic Places—but also culturally significant, even "sacred," manifestations of ancestral cultural activity. They remain deeply meaningful and deserving of attention and protection for their own intrinsic value. Acknowledged and cared for with due respect, these trees will remain as waypoints for the inland Dena'ina people of today, just as they served as waypoints for the ancestors long ago.

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Compliance with Ethical Standards This research has been conducted with the involvement and oversight of the Nondalton Tribal Council, a sovereign tribal nation representing all study interviewees, working in direct collaboration with the National Park Service (NPS) and Portland State University (PSU).

Informed consent procedures also applied to all interviewees; NPS and/or PSU have obtained consent forms from interviewees. Nondalton Tribal Council has reviewed and approved the present manuscript for publication. Findings presented here reflect the outcomes of no fewer than two separate studies, including NPS-funded studies of the Chulitna River-Sixmile Basin, undertaken collaboratively by NPS and PSU under a Cooperative Ecosystem Studies Unit grant (under Cooperative Agreement P11AC90967), and a Bureau of Indian Affairs Integrated Resource Management grant to Nondalton Tribal Council.

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